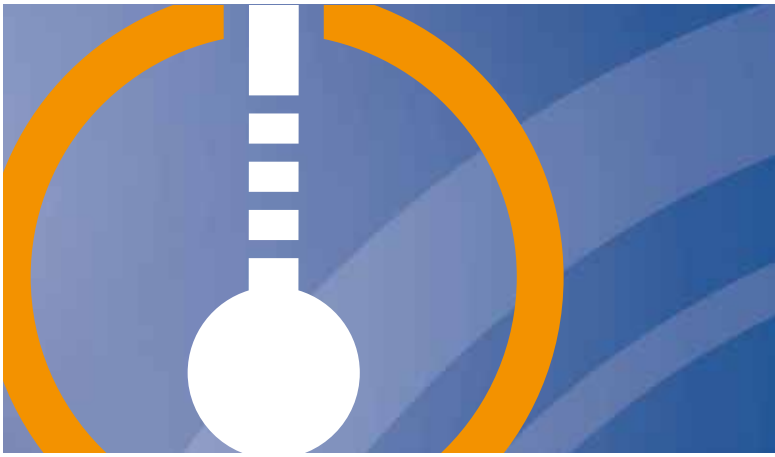
JUMO

More than sensors + automation

# Temperature

Innovative solutions for the most demanding standards



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E-mail: temperaturemeasurement@jumo.net

# Dear Reader,

Temperature one of the most commonly measured physical parameters in the world.
The mid 1960s were the beginning of an era during which JUMO perfected the manufacturing of high-quality precise and long-term-stable temperature probes as a core competence. Since this time, JUMO has produced top-rate RTD temperature probes and thermocouples. We are now one of the leading manufacturers worldwide.
Our customers benefit from our excellent experience in design and our first-rate manufacturing know-how.
These two advantages allow us to manufacture batches with small quantities, but also large quantities for series production with a high level of automation. JUMO has achieved an extraordinary quality standard through motivated employees, statistical process control and optimum processes. High standards are imposed starting with the design process. This leads to innovative, economical solutions that are right for the market. Another important factor is extensive qualification measures for our products. Especially in series production, we conduct these measures together with our customers. We keep our products at the state of the art through continuous new and ongoing development.

Our competence is further reinforced by our DAkkS laboratory where highly precise measurements are possible, and by our own temperature sensor thin film manufacturing. We have been manufacturing platinum-chip temperature sensors in complex production processes for 30 years.
Today JUMO temperature sensors are used in many areas of industry and services where they guarantee consistent, high quality in products.
The customer is always the focus of attention in all we do. Customer satisfaction and long-term collaboration are matters of prime concern for us. They are the driving force for our continued top-class performance.

This brochure will give you an overview of our products. Of course we would also be happy to develop individual solutions for you, completely customized to your requirements.

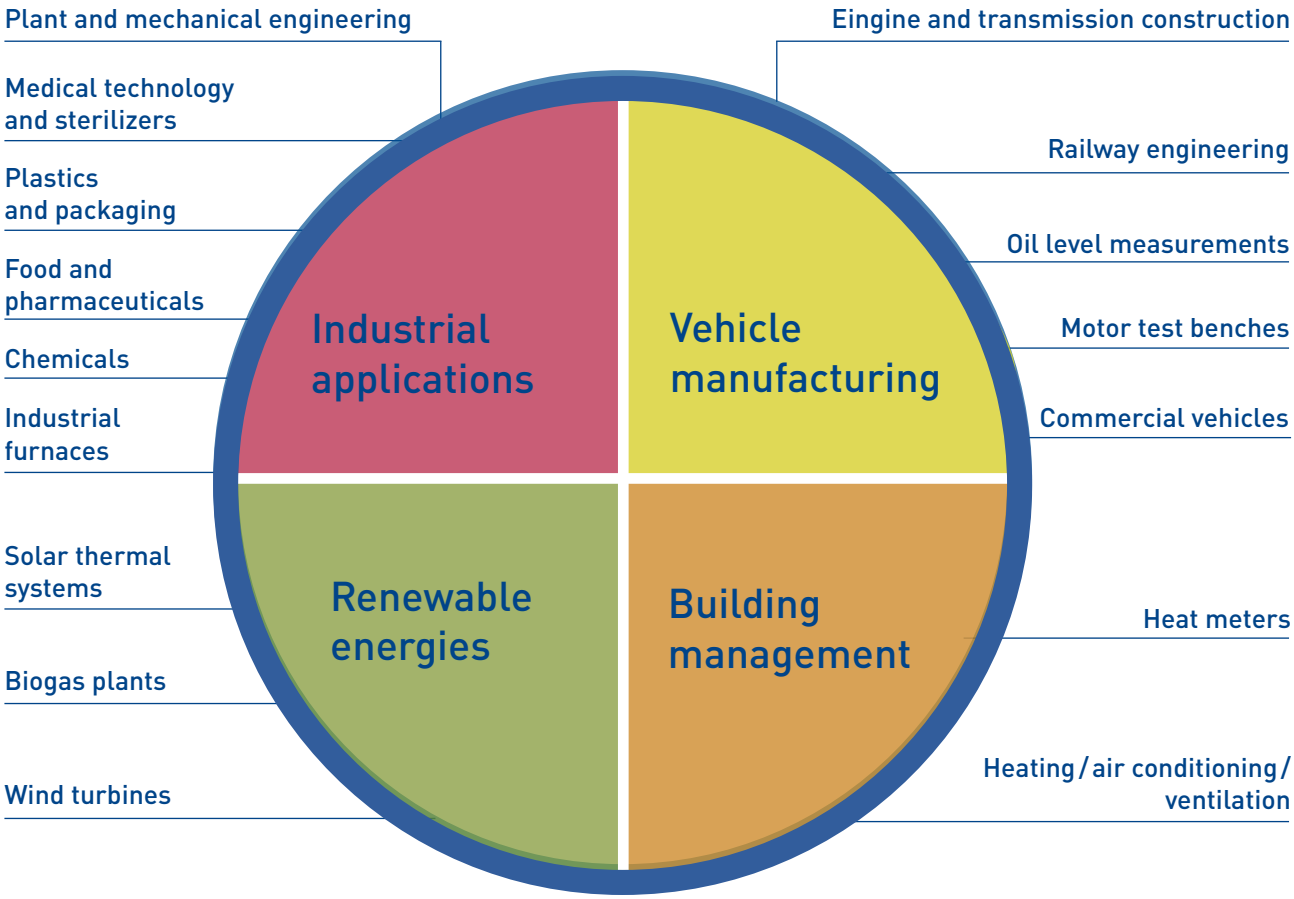
You can find detailed information about our products under the specified type/product group number at www.jumo.net.

# Contents

# Temperature measurements

Temperature is one of the most important process variables in the industry. Temperatures must be recorded and processed for numerous manufacturing processes.
The spectrum of applications ranges from measurements in building services to measuring a temperature of up to 1600 °C in industrial furnace construction and foundry technology. Because so many different applications are involved, the thermal and mechanical requirements for temperature probes vary widely and have changed over the years. Instruments can be adapted for specific measuring tasks with various protection fittings and materials as well as terminal heads, cables and connectors. This makes it possible to produce reliable results even with extreme vibrations, atmospheres containing steam and under pressure, and aggressive media.

# Industrial sectors




In addition to products for these industries, our portfolio also includes many other design types for other applications. To find the right product for you, just contact us!

**Approvals**

ATEX, GOST, DIN EN 14597, GL, EHEDG

# Thermocouples

Thermocouples are used to measure hotter temperatures. Different thermal pairs can be used depending on the requirement. Available types are L, J, K, N, S and B. The corresponding voltage series and limit deviations are standardized according to DIN EN 60584 and DIN 43710. Compensating cables and thermal cables must be used for the connection. The different lines (casing tube and stranded wire) are color coded depending on the type. Applications above 800 °C require the use of protection fittings made of heat-resistant steel or ceramic.
If extended transmission paths need to be covered, a transmitter in the terminal head with an output of 4 to 20 mA is generally recommended.

# Sample application

**JUMO mineral-insulated thermocouples**
with standard tab connectors according to DIN 43 710 and DIN EN 60 584
type 901221

The soil freezing system under construction

The soil freezing system in operation

## Safeguarding a construction method in civil engineering with freezing soil

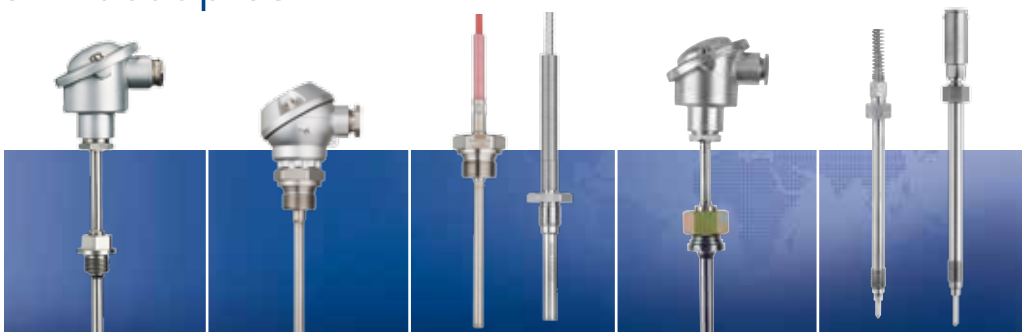
To make it possible to connect a wastewater pipe to a shaft on-site and to concrete it in, the national roads administration in Oslo, Norway decided to apply a waterproof seal by freezing the soil. This is a method by which artificially freezing the water in the soil solidifies the soil and makes it impermeable to water.

A company specializing in soil freezing developed a freezer design for laying wastewater pipes consisting of a total of 19 cooling tubes, each 10 m in length. Liquid nitrogen is pumped through cooling tubes into the ground at a temperature of –196 °C. The nitrogen emerges and comes in direct contact with the soil.

The evaporation process that then occurs rapidly draws heat from the ambient soil. To record the temperature, the cooling tube inputs are fitted with a total of 19 JUMO mineral-insulated thermocouples with a fixed compensating circuit of type 901221/20... and 20 Pt 100 RTD temperature probes with a fixed connecting cable of type 902150/10... to measure the temperature in the frozen ground. They had been installed in the soil at different depths and distances from the tubes.

It takes a total of four days to freeze the soil. This time matches the calculations of the Finite Element Program (FEM = Finite-Element Method) for heat transfer in the soil.

# Screw-in thermocouples



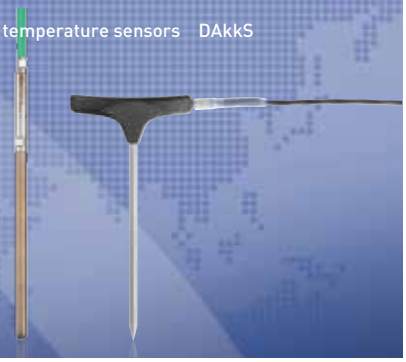
| | Designation | Screw-in thermocouple with terminal head form B | Screw-in thermocouple with terminal head form J | Screw-in thermocouple with connecting cable | Screw-in/push-in thermocouple for devices and plants tested to DIN EN 14597 | Screw-in melt thermocouple |
|---|---|---|---|---|---|---|
| | Type/data sheet | 901020 | 901030 | 901050 | 901006 | 901090 |
| Application | Features | – | | | For operating media water, oil and air | – |
| Application | Application ranges | Woodworking machines, drying systems, furnaces, smelteries and rolling mills | Solid fuel boilers, plastics industry | Industry kitchen equipment suppliers, temperature control instruments, plastics industry | Boiler construction, oil heat transfer medium, combined heat and power plants | Plastics industry |
| Technical data | Connection | Head | | Cable | Head, cable | Cable, connector |
| Technical data | Operating temperature | –200 to +800 °C | –200 to +800 °C | –200 to +600 °C | 0 to +1500 °C | –40 to +600 °C |
| Technical data | Measuring circuits | 1/2 | | | | 1 |
| Technical data | Thermal pairs | J, L, K | | L, K | L, K, S, B | J, L, K |
| Technical data | Process connection | Thread | | | Thread, flange, pipe screw connection | Thread |
| Technical data | Protection fitting | Stainless steel | Stainless steel | Stainless steel | Stainless steel, steel, ceramic | Stainless steel, coating |
| Technical data | Protection type | IP65 | | – | | |
| Technical data | Option | Transmitter in the head | – | Non-insulated layout | – | Non-insulated layout |
| Technical data | Approvals | GOST | | – | Devices tested for DIN EN 14597 | – |
| Technical data | Special features | Replaceable measuring insert, extension tube | Union nut | Cable made of silicone, PTFE, metal braiding | | Cable made PTFE, metal braiding, Probe tip flat/ blade-shaped |

# Push-in thermocouples

| | Designation | Push-in thermocouple with terminal head form A | Push-in thermocouple with terminal head form B | Push-in thermocouple with connecting cable | Push-in thermocouple with bayonet lock |
|---|---|---|---|---|---|
| | Type/data sheet | 901110 | 901120 | 901150 | 901190 |
| Application | Features | – | | | Adjustable spring pressure ensures good heat transfer |
| Application | Application ranges | Furnace construction, smelteries, rolling mills, steel plants, iron plants, waste incineration | Furnace construction, industrial heating plants, foundry industry | Industry kitchen equipment suppliers, hot runner systems, analysis devices | Plastics industry, woodworking machines, printing machines |
| Technical data | Connection | Head | | Cable | |
| Technical data | Operating temperature | –200 to +1600 °C | –200 to +1600 °C | –50 to +600 °C | 0 to 400 °C |
| Technical data | Measuring circuits | 1/2 | | 1 | 1/2 |
| Technical data | Thermal pairs | J, L, K, S, B | | L, K | J, L, K |
| Technical data | Process connection | Flange, pipe screw connection | | – | Bayonet lock |
| Technical data | Protection fitting | High-temperature steel, ceramic | | Stainless steel | |
| Technical data | Protection type | IP54 | IP65 | – | |
| Technical data | Option | Transmitter in the head | | Non-insulated layout | Shielded cable |
| Technical data | Approvals | GOST | | – | |
| Technical data | Special features | – | | Cable made of silicone, metal braiding, also right-angle cable outlet | Cable made of silicone, PTFE, metal braiding, ceramic probe tip |

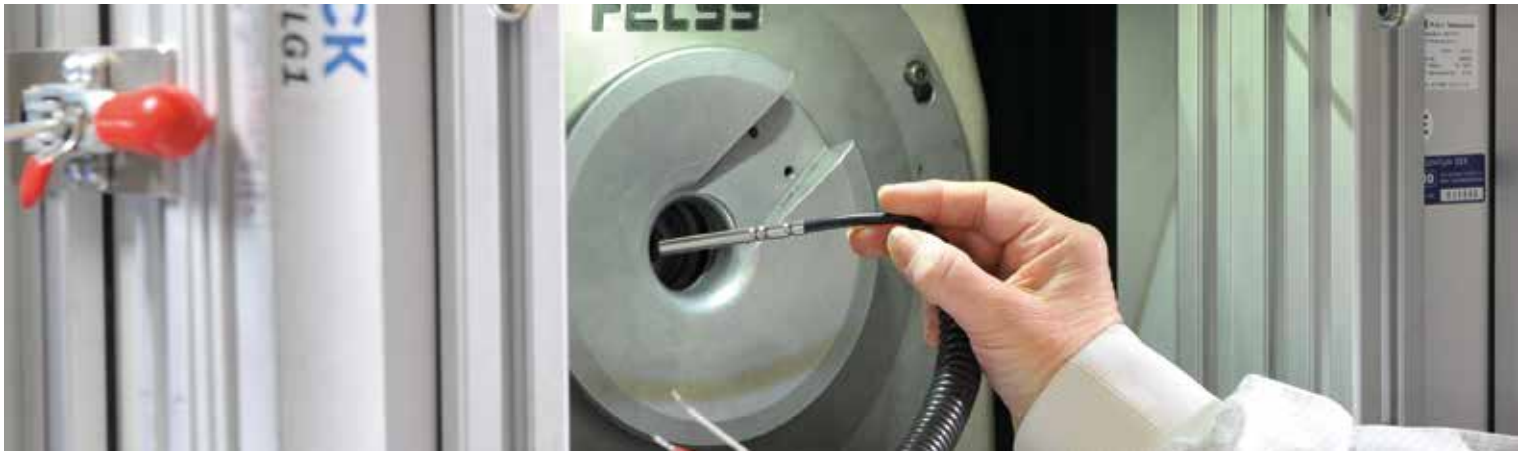
# Mineral-insulated thermocouples

| | | | | | |
|---|---|---|---|---|---|
| | **Designation** | **Mineral-insulated thermocouple with bare connecting wires** | **Mineral insulated thermocouple with terminal head form J** | **Mineral-insulated thermocouple with standard tab connector** | **Mineral-insulated thermocouple with thermal cable** |
| | **Type/data sheet** | 901210/10 | 901230/40 | 901240/20 | 901250/3x |
| Application | **Features** | Flexible sheath cable, vibration-resistant | | | |
| Application | **Application ranges** | Processing measurements | Meat processing industry, combined heat and power plants, baking oven | Hot runner industry, plastics industry | Hot runner industry, industrial heating plants, Industry kitchen equipment suppliers biogas plants |
| Technical data | **Connection** | Connecting wires | Head | Connector | Connecting cable |
| Technical data | **Operating temperature** | –200 to +1200 °C | | | 0 to 1200 °C |
| Technical data | **Measuring circuits** | 1/2 | | 1 | 1/2 |
| Technical data | **Thermal pairs** | J, L, K | | | |
| Technical data | **Process connection** | – | Thread | – | Clamping screw connection |
| Technical data | **Protection fitting** | Stainless steel, inconel | | | |
| Technical data | **Protection type** | – | IP65 | – | |
| Technical data | **Option** | Non-insulated layout | Transmitter in the head | Non-insulated layout | |
| Technical data | **Approvals** | GOST | | | |
| Technical data | **Special features** | – | | ∅ 0.5 mm and up | ∅ 0.5 mm and up, cable made of silicone, PTFE, glass fiber / metal braiding |



# Insertion thermocouples

| | Designation | JUMO FOODtemp Insertion thermocouple with PTFE handle | JUMO FOODtemp Insertion thermocouple with PEEK handle | JUMO FOODtemp Insertion thermocouple with PEEK handle |
|---|---|---|---|---|
| | Type/data sheet | 901350/33/63 | 901350/83 | 901350/84 |
| Application | Features | Steam-tight, high mechanical strength, multiple measuring points | | |
| Application | Application ranges | Meat processing plant suppliers, sterilizers | Industry kitchen equipment suppliers | Industry kitchen equipment suppliers, sterilizers |
| Technical data | Connection | Cable | | |
| Technical data | Operating temperature | –100 to +260 °C | | |
| Technical data | Measuring circuits | 3/4/5 | 3/4 | |
| Technical data | Thermal pairs | K | | |
| Technical data | Handle | ∅ 12 mm, 15 mm | T form | ∅ 11.5 mm |
| Technical data | Protection fitting | Stainless steel | | |
| Technical data | Protection type | IP67 | | |
| Technical data | Special features | Probe tip concentric/ angled | Probe tip concentric/ angled, Cable outlet on the side | Probe tip concentric/ angled |

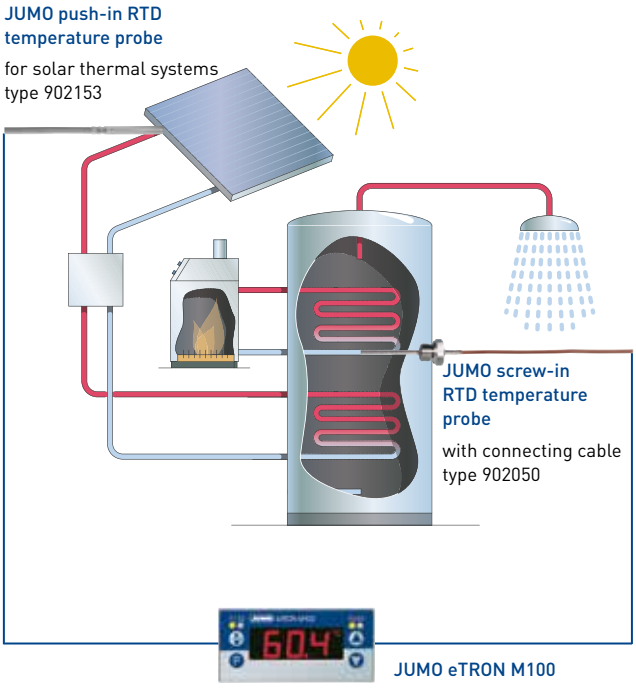


# RTD temperature probes

Temperature is measured in many industrial applications with RTD temperature probes. Platinum is widely used as the resistance material because it guarantees high measuring accuracy and long-term stability. The electrical resistance is temperature-dependent, increasing as the temperature rises. It is used as the measured value.

This is referred to as a positive temperature coefficient (PTC). The most widely used nominal values are Pt 100, Pt 500 and Pt 1000. The various nominal values, temperature-dependent output characteristic and tolerances are specified in DIN EN 60 751.

# Sample application




Control of a solar power unit with JUMO

## JUMO RTD temperature probe for solar thermal energy

Though often underestimated, temperature probes are an important part of a solar thermal system. They must be temperature-resistant, leak-proof and long-term stable, must withstand extremely adverse operating conditions on the roof and return reliable measurement results for the service life of the solar power unit, which may be 20 years or more. For guaranteed results, use of a Pt 1000 platinum temperature sensor is recommended. Because such a high nominal value is maintained, the resistance of the connecting cable has only minimal effect on the temperature measurement.

While the sun's potential may be free, the source of economical and high-quality solar sensors is JUMO. The company has been recognized as a high-quality supplier of solar thermal energy sensors for many years. JUMO RTD temperature probes have proven their effectiveness in practical applications a million times over.

The same applies to the small system for private houses and to the large professional plants.

# Screw-in RTD temperature probes

| | | | | | |
|---|---|---|---|---|---|
| | **Designation** | **Screw-in RTD temperature probe with terminal head, form B** | **JUMO Etemp B Screw-in RTD temperature probe with terminal head form B for standard applications** | **Screw-in RTD temperature probe with terminal head form J** | **JUMO VIBROtemp Screw-in RTD temperature probe with plug connector** |
| | **Type / data sheet** | 902020 | 902023 | 902030 | 902040 |
| Application | **Features** | – | | | Highly vibration-resistant |
| Application | **Application ranges** | Plant engineering, construction material machines, drying systems, biogas plants, combined heat and power plants | Mechanical engineering, confectionery industry | Mechanical engineering, thermostat baths, transmission construction, meat processing industry | Commercial vehicles, compressors, motor construction, railway engineering |
| Technical data | **Connection** | Head | | | Connector |
| Technical data | **Operating temperature** | –50 to +600 °C | –50 to +400 °C | | –50 to +300 °C |
| Technical data | **Measuring circuits** | 1 / 2 | | | 1 |
| Technical data | **Sensor** | Pt 100, Pt 500, Pt 1000 | | | Pt 100, Pt 500, Pt 1000, KTY |
| Technical data | **Process connection** | Thread | | | |
| Technical data | **Protection fitting** | Stainless steel | | | Stainless steel, brass |
| Technical data | **Protection type** | IP65 | | | IP 65, IP 69K |
| Technical data | **Option** | Transmitter in the head | | | – |
| Technical data | **Approvals** | GOST | – | GOST | – |
| Technical data | **Special features** | Replaceable measuring insert, extension tube | Fast measurements in air | Fast measurements in air, spring-mounted screw connection | Vibration-resistant |

# Screw-in RTD temperature probes

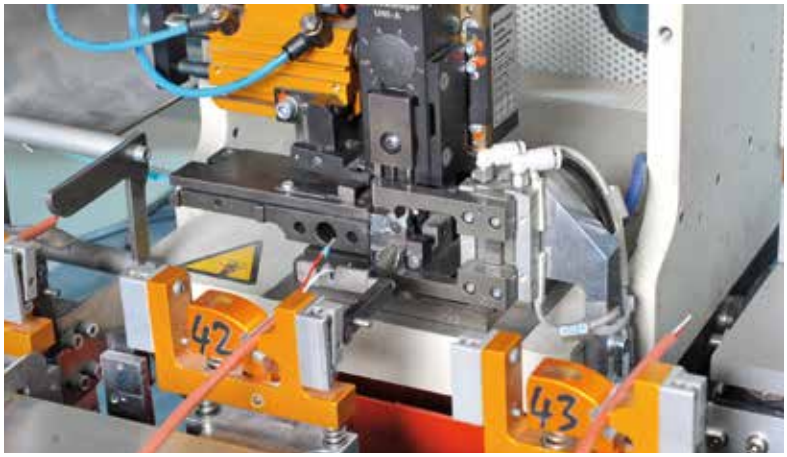
| | Designation | Screw-in RTD temperature probe with plug connector | Screw-in RTD temperature probe with connecting cable | Screw-in /push-in RTD temperature probe for devices and plants tested to DIN-EN 14597 | Screw-in melt RTD temperature probe |
|---|---|---|---|---|---|
| | Type/data sheet | 902044 | 902050 | 902006 | 902090 |
| Application | Features | Highly vibration-resistant, cable connector according to DIN EN 175301-803 | – | For operating media water, oil, air | – |
| Application | Application ranges | Shipbuilding, motor construction, industrial boiler plants, pump manufacturing | Machine construction, heating, air conditioning and ventilation, refrigeration components, transmission construction | Boiler construction, oil heat transfer medium, furnaces | Plastics industry |
| Technical data | Connection | Connector | Cable | Head, cable | Cable, connector |
| Technical data | Operating temperature | –50 to +260 °C | –50 to +400 °C | –170 to +700 °C | –50 to +400 °C |
| Technical data | Measuring circuits | 1 | 1/2 | 1/2/3 | 1/2 |
| Technical data | Sensor | Pt100 | | | |
| Technical data | Process connection | Thread | | Thread, flange, pipe screw connection | Thread |
| Technical data | Protection fitting | Stainless steel | Stainless steel, inconel | Stainless steel, steel | Stainless steel, coating |
| Technical data | Protection type | IP65 | – | – | – |
| Technical data | Option | Transmitter | Shielded cable | – | Ceramically insulated probe tip |
| Technical data | Approvals | GL | GOST | for DIN EN 14597 | – |
| Technical data | Special features | Replaceable measuring insert for variants without transmitter | Cable made of PVC, silicone, PTFE, metal braiding | – | Cable made PTFE, metal braiding, probe tip flat/ blade-shaped |

# Push-in RTD temperature probes

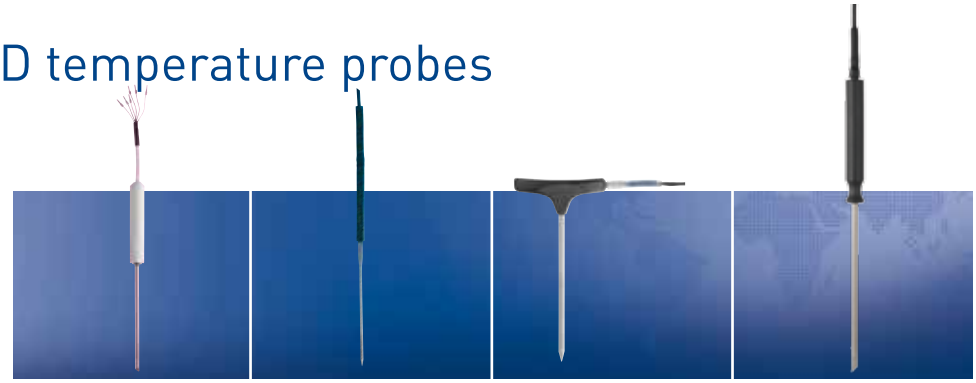
| | Designation | Push-in RTD temperature probe with terminal head form B | JUMO Etemp B push-in RTD temperature probe with terminal head form B for standard applications | Push-in RTD temperature probe with terminal head form J | Push-in RTD temperature probe with connecting cable | Push-in RTD temperature probe with connecting cable for solar thermal systems | Push-in RTD temperature probe with bayonet lock |
|---|---|---|---|---|---|---|---|
| | Type/data sheet | 902120 | 902123 | 902130 | 902150 | 902153 | 902190 |
| Application | Features | – | – | – | – | For collector and storage temperature measurements | Adjustable spring pressure ensures good heat transfer |
| Application | Application ranges | Plant engineering, industrial heating plants, drying systems, construction material machines | Mechanical engineering, plant engineering | Mechanical engineering, temperature control instruments, conveyor systems, textile industry | Thermostat baths, packaging machine industry, heating and drying chambers, hydraulic plants | Solar thermal systems | Plastics industry, special machine construction |
| Technical data | Connection | Head | | | Cable | | |
| Technical data | Operating temperature | –50 to +600 °C | –50 to +400 °C | –50 to +400 °C | | –50 to +260 °C | –50 to +350 °C |
| Technical data | Measuring circuits | 1/2 | | | | 1 | 1/2 |
| Technical data | Sensor | Pt100 | | Pt100, Pt1000 | Pt100 | Pt100, Pt1000 | Pt100 |
| Technical data | Process connection | Flange, pipe screw connection | | | – | – | Bayonet lock |
| Technical data | Protection fitting | Stainless steel | | | | Stainless steel, brass | Stainless steel |
| Technical data | Protection type | IP65 | | | – | – | – |
| Technical data | Option | Transmitter in the head | | | Shielded cable | – | Shielded cable |
| Technical data | Approvals | GOST | – | GOST | – | – | – |
| Technical data | Special features | Replaceable measuring insert | – | Fast measurements in air | Cable made of PVC, PUR, silicone, PTFE, metal braiding | Cable made of PVC, PUR, silicone, PTFE | Cable made of silicone, PTFE, metal braiding, ceramic probe tip |

# Mineral-insulated RTD temperature probes

| | Designation | Mineral-insulated RTD temperature probe with bare connecting wires | Mineral-insulated RTD temperature probe with terminal head | Mineral-insulated RTD temperature probe with Lemosa® connector | Mineral-insulated RTD temperature probe with connecting cable |
|---|---|---|---|---|---|
| | Type/data sheet | 902210/10 | 902210/40 | 902210/20 | 902210/3x |
| Application | Features | Flexible sheath cable, vibration-resistant | | | |
| Application | Application ranges | Processing measurements | Painting and drying systems, combined heat and power plants, plant engineering | Plant engineering, chemical industry | Furnace industry, electric motors, generators, mechanical engineering, packaging industry |
| Technical data | Connection | Connecting wires | Head | Connector | Connecting cable |
| Technical data | Operating temperature | –200 to +600 °C | | | |
| Technical data | Measuring circuits | 1/2 | | | |
| Technical data | Sensor | Pt100, Pt1000 | | | |
| Technical data | Process connection | – | Thread | – | |
| Technical data | Protection fitting | Stainless steel | | | |
| Technical data | Protection type | – | IP65 | – | |
| Technical data | Option | – | Transmitter in the head | – | |
| Technical data | Approvals | GOST | | | |
| Technical data | Special features | ∅ 1.9 mm and up | | | ∅ 1.9 mm and up, cable made of PVC, silicone, PTFE, metal braiding |

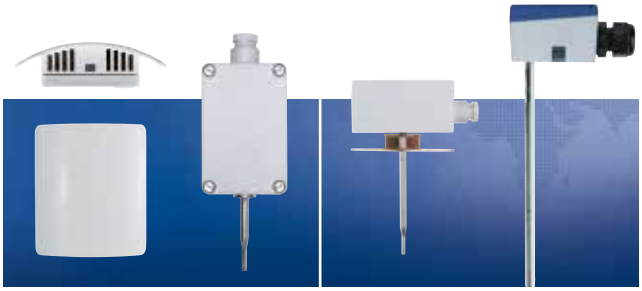



# Insertion RTD temperature probes



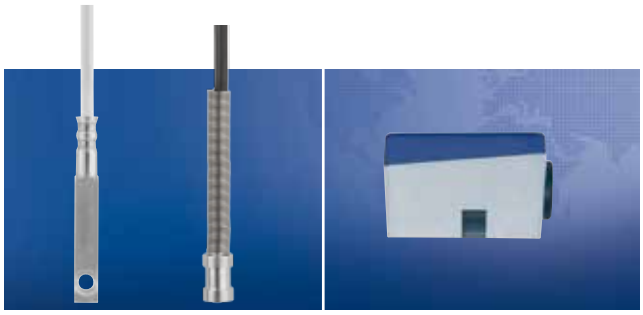
| | | | | | |
|---|---|---|---|---|---|
| | **Designation** | **JUMO FOODtemp insertion RTD temperature probe with PTFE handle** | **JUMO FOODtemp Insertion RTD temperature probe with FPM handle** | **JUMO FOODtemp Insertion RTD temperature probe with PEEK handle** | **JUMO FOODtemp Insertion RTD temperature probe with PEEK handle** |
| | **Type/data sheet** | 902350/22/23 | 902350/37/38 | 902350/82/83 | 902350/84 |
| Application | **Features** | Steam-tight, high mechanical strength | | | |
| Application | **Application ranges** | Industry kitchen equipment suppliers, Meat processing plant suppliers, baking oven | Apparatus manufacturing | Industry kitchen equipment suppliers, | Industry kitchen equipment suppliers, baking oven |
| Technical data | **Connection** | Cable | | | |
| Technical data | **Operating temperature** | –50 to +260 °C | –50 to +200 °C | –50 to +260 °C | |
| Technical data | **Measuring circuits** | 1/2 | 1 | 1/2 | |
| Technical data | **Sensor** | Pt100 | | | |
| Technical data | **Handle** | ∅ 10 mm, ∅ 12 mm, ∅ 15 mm | ∅ 6.5 mm | T form | ∅ 11.5 mm, ∅ 20 mm, ∅ 15 mm |
| Technical data | **Protection fitting** | Stainless steel | – | Stainless steel | |
| Technical data | **Protection type** | IP67 | – | IP67 | |
| Technical data | **Option** | Non-insulated layout | Transmitter in the head | Non-insulated layout | |
| Technical data | **Approvals** | GOST | | | |
| Technical data | **Special features** | Probe tip concentric/angled | – | Probe tip concentric/angled, cable outlet on the side | Probe tip concentric/angled |

# Ambient RTD temperature probes



| | | | |
|---|---|---|---|
| | **Designation** | **Ambient and outdoor RTD temperature probe** | **RTD temperature probe** |
| | **Type/data sheet** | 902520/10/11/13 | 902520/20/25 |
| Application | **Features** | Wall mounting | Duct mounting |
| Application | **Application ranges** | Building services management, combined heat and power plants | Building services management, warm air generator |
| Technical data | **Connection** | Terminal box | |
| Technical data | **Operating temperature** | –50 to +90 °C | –50 to +200 °C |
| Technical data | **Measuring circuits** | 1/2 | 1/2 |
| Technical data | **Sensor** | Pt 100, Pt 1000, Ni 1000 | |
| Technical data | **Process connection** | – | Pipe screw connection, flange |
| Technical data | **Protection fitting** | – | Stainless steel |
| Technical data | **Protection type** | IP65 | |
| Technical data | **Option** | Transmitter | |
| Technical data | **Approvals** | GOST | |

# Surface RTD temperature probes



| | | | |
|---|---|---|---|
| | **Designation** | **Surface RTD temperature probe with connecting cable** | **Surface RTD temperature probe** |
| | **Type/data sheet** | 902550 | 902550 |
| **Application** | **Features** | Low thermal mass for round and level surfaces | |
| | **Application ranges** | Packaging machines, installation in tubing | Plant engineering |
| **Technical data** | **Connection** | Cable | Terminal box |
| | **Operating temperature** | –50 to +260 °C | –50 to +120 °C |
| | **Measuring circuits** | 1 | |
| | **Sensor** | Pt100, Pt500, Pt1000 | Pt100, Pt500, Pt1000, Ni1000 |
| | **Process connection** | Screw, retaining strap | Retaining strap |
| | **Protection fitting** | Stainless steel, aluminum | – |
| | **Protection type** | – | IP65 |
| | **Option** | Anti-kink protection | – |
| | **Special features** | Cable made of PVC, silicone, PTFE, stainless steel-PTFE | Includes installation kit |

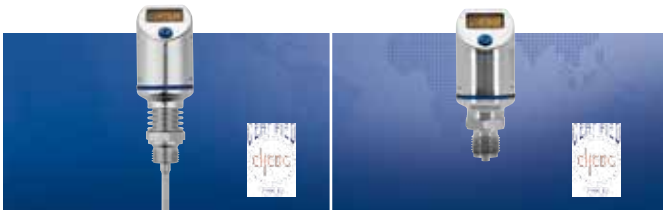
# RTD temperature probes for industrial applications

| | Designation | RTD temperature probe for the food/pharmaceutical industry | Screw-in RTD temperature probe without/with transmitter | JUMO PROCESS-temp RTD temperature probe for process technology with ATEX approval | JUMO STEAMtemp Push-in RTD temperature probe resistance thermometer, steam-tight version | Level and temperature probe for commercial vehicles, construction and agricultural machinery | JUMO CANtrans T RTD temperature probe with CANopen output |
|---|---|---|---|---|---|---|---|
| | Type/data sheet | 902810 | 902815 | 902820 | 902830 | 902880 | 902910 |
| Application | Features | EHEDG certification | | Ex approval, protect tubes stainless steel, titanium, tantalum, inconel, Hastelloy | Steam-tight, high protection type | Highly vibration-resistant, level measurement based on the hot-wire principle | |
| Application | Application ranges | Food industry, pharmaceutical industry | | Process industry, chemical industry, plant engineering, pump manufacturing | Sterilizers, pharmaceuticals, food industry, institutes, research facilities | Comm. vehicles, construction, agricultural machinery, engine/transmission construction | Woodworking machines,drying systems, furnaces, smelteries and rolling mills |
| Technical data | Connection | Head | M12 connector | Head | Cable | | Head |
| Technical data | Operating temperature | –50 to +250 °C | –50 to +260 °C | –200 to +600 °C | –70 to +200 °C | –40 to +140 °C | –200 to +800 °C |
| Technical data | Measuring circuits | 1/2 | 1 | 1/2 | 1/2/3 | 1/2 | |
| Technical data | Sensor | Pt100 | Pt100, Pt1000 | Pt100 | | Voltage / Pt100, Pt1000 | Pt 1000 |
| Technical data | Process connection | Hygienic process connections, JUMO PEKA | | Thread, flange | | Thread | |
| Technical data | Protection fitting | Stainless steel | | | Stainless steel, steel, ceramic | Stainless steel, coating | – |
| Technical data | Protection type | IP67 | | IP65 | IP69 | – | |
| Technical data | Option | Transmitter in the head | Transmitter | Transmitter in the head | Shielded cable | Corrugated tubing | Transmitter in the head |
| Technical data | Approvals | EHEDG | | Ex-ATEX, GOST | – | | GOST |
| Technical data | Special features | Process connections designed for CIP, electrolytically polished Ra≤ 0.8 µm | | Replaceable measuring insert, Ex i, Ex d | Cable made of FEP, PTFE, silicone | Cable made of cross-linked, polyester | Replaceable measuring insert, extension tube |

# Heat meter RTD temperature probes

| | | | | | |
|---|---|---|---|---|---|
| | **Designation** | **JUMO HEATtemp Screw-in RTD temperature probe for heat meter with connecting cable for direct installation (type DS/DL)** | **JUMO HEATtemp Push-in RTD temperature probe for heat meter with connecting cable for immersion sleeves (type PS/PL)** | **JUMO HEATtemp screw-in RTD temperature probe for heat meter with terminal head for direct mounting (type DL)** | **JUMO HEATtemp push-in RTD temperature probe for heat meter with terminal head for immersion sleeve (type PL)** |
| | **Type/data sheet** | 902425 | 902435 | 902424 | 902434 |
| Application | **Features** | Paired and verified according to the German calibration regulations and MID initial calibration, production certified according to module D of the MID (CE and metrology mark) | | | |
| Application | **Application ranges** | Heat and cold meters | | | |
| Technical data | **Connection/ connecting cable** | Connecting cables with ferrules / PVC, PUR, TPE, silicone | | Terminal head with screw terminals/ – | |
| Technical data | **Operating temperature** | 0 to 180 °C | Type PS: 0 to +150 °C; Type PL: 0 to +180 °C | 0 to 180 °C | |
| Technical data | **Process connection** | Type DS: Screw connection M 10x1; Type DL: Thread G 1/4, G 1/2 stainless steel | Push-in RTD temperature probe for thermowells | Thread G 1/2, stainless steel | Push-in RTD temperature probe for thermowells |
| Technical data | **Protection fitting** | Type DS: Stainless steel Ø 5.4 mm, stepped to Ø 3.3/Ø 3.6 mm | Type PS: Stainless steel Ø 5, 5.2 or 6 mm; Type PL: Stainless steel Ø 6 mm, protection tube with fitting tolerance for thermowells | Stainless steel, Ø 8 mm, stepped to Ø 6 mm | Ø 6 mm with fitting tolerance for thermowell; stainless steel |
| Technical data | **Temperature difference** | 3 to 180 K | Type PS: 3 to 150 K Type PL: 3 to 180 K | 3 to 180 K | |
| Technical data | **Minimum immersion depth** | Type DS: 15 mm, Type DL: 30, 60 to 280 mm | Type PS: > 15 mm | 30 mm | |
| Technical data | **Fitting length** | Type DS: 25 to 60 mm Type DL: 60 to 280 mm | Type PS: 45 to 85 mm Type PL: 85 to 450 mm | 85 to 280 mm | 85 to 400 mm |
| Technical data | **Approvals** | Approval for heat meters, MID and national approval as replaceable temperature probes. Meets the requirements of DIN EN 1434, AGFW FW 202 and FW 211, Approval for cold meters and combined cold/heat meters | | | |

# JUMO DELOS series
# precision transmitters for temperature or pressure



| | Designation | JUMO DELOS T<br>for temperature | JUMO DELOS SI<br>for pressure and filling level |
|---|---|---|---|
| | Type/data sheet | 902940 | 405052 |
| Application | Features | Programmable, switching output, selectable display for unit, case and protection fitting made of stainless steel (316L) | Programmable, switching output, measuring range 1:4, selectable display for unit, case and protection fitting made of stainless steel (316L) |
| Application | Application ranges | Food and pharmaceutical applications, CIP/SIP systems, plant and mechanical engineering, refrigeration and air conditioning system construction | |
| Technical data | Input | –50 °C to +150 °C<br>–50 °C to +260 °C with extension tube<br>–50 °C to +500 °C with remote RTD temperature probe | rel, abs<br>400 mbar to 600 bar |
| Technical data | Permissible temperatures | Environment: –25 to +75 °C | Environment: –25 to +75 °C<br>Medium to be measured: –25 to +200 °C |
| Technical data | Accuracy | Tolerance class: class A, (optionally class AA ) | Linearity of measuring span: 0.1 to 0.15 % |
| Technical data | Output | 1 x PNP switching output,<br>2 x PNP switching output,<br>1 x PNP switching output and 1 x analog output<br>(choose from 0 (4) to 20 mA, 0 to 10 V) | |
| Technical data | Protection type | IP 67 | |
| Technical data | Process connection | Thread,<br>hygienic connections,<br>screw connections,<br>JUMO PEKA | Thread,<br>hygienic connections,<br>pressure separator,<br>JUMO PEKA |
| Technical data | Approvals | EHEDG | |

# Wireless data transmission – Wtrans probe

| | | | | |
|---|---|---|---|---|
| | **Designation** | **JUMO Wtrans probeT01<br>RTD temperature probe<br>with electronic modules<br>up to 85 °C** | **JUMO Wtrans probe T02<br>RTD temperature probe<br>with electronic modules<br>up to 125 °C** | **JUMO Wtrans probe T03<br>RTD temperature probe<br>with ATEX approval and<br>electronic modules up to 85 °C** |
| | **Type/data sheet** | 902930/10/12/50 | 902930/20/22/60 | 902930/15/17/55 |
| **Application** | **Features** | – For operating temperature from –30 to +260 °C or –200 to +600 °C *<br>– For mobile or stationary temperature measurements<br>– Wiring expenses are eliminated with modern wireless technology<br>– Fail-safe transmission with telegram coding | | |
| **Technical data** | **Transmission frequency** | 868.4 MHz (Europe); 915 MHz (USA, Australia, Canada, New Zealand and other countries);<br>10 frequencies can be configured in the 915 MHz frequency band | | |
| | **Transmission interval** | Adjustable from 1 to 3600 s;<br>Factory setting for basic type 902930/10, 902930/12 and 902930/50 = 10 s;<br>Factory setting for basic type 902930/20, 902930/22 and 902930/60 = 15 s;<br>Factory setting for basic type 902930/15, 902930/17 and 902930/55 = 20 s;<br>Adjustable via DIP switches 5 s, 10 s, 20 s or 45 s | | |
| | **Open air range** | Up to 300 m if a holder for wall mounting is used on the receiver side and with an antenna cable 3 m long | | |
| | **Transmitter Detection (transmitter ID)** | 5-digit ID, set in the factory with customer-specific configuration also possible | | |
| | **Measurement input** | Pt 1000 according to DIN EN 60 751, in 3-wire circuit | | |
| | **Protection type** | IP 67 according to DIN EN 60 529;<br>For basic type 902930/10, 902930/12, 902930/15, 902930/17, 902930/20 and 902930/22;<br>For basic type 902930/50, 902930/55 and 902930/60 ** | | |
| | **Lithium battery** | Voltage: 3.6 V; rated capacity: 2,2 Ah/1.7Ah | | |
| | **Available approvals/approval marks** | – IC (Industry Canada) for 915 MHz<br>– FCC (Federal Communications Commissions) for 915 MHz<br>– c UL us (Underwriters Laboratories)<br>– ATEX approval for 868,4 MHz *** | | |

* Not for T03.

** Only with machine connector M 12×1 screwed on.

*** For Wtrans T03.

# Wireless data transmission – Wtrans receiver

Operation and configuration is possible via the keyboard in connection with a 2-line LCD display or, more comfortable, using a setup program. Thus, parameters such as filter constants, offset, alarms and fly back (minimum and maximum value memory) can be separately set for each channel. For this purpose, a plug is provided on the front for a PC interface with TTL/RS 232 or USB/TTL converter to connect the receiver and the PC.

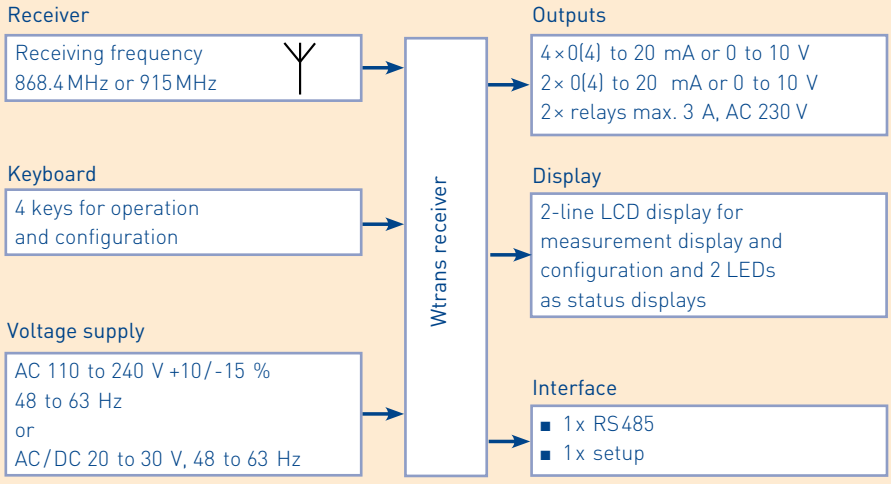
Type 902931

## Features

**Wtrans T01**
**DIN rail case, IP 20**

- For RTD temperature probe, thermocouple, potentiometer and voltage
- Interface RS 485 with Modbus protocol
- Wireless reception of measurement values
- Wiring expenses are eliminated with modern wireless technology
- For up to 16 transmitters per receiver

## Block diagram of receiver

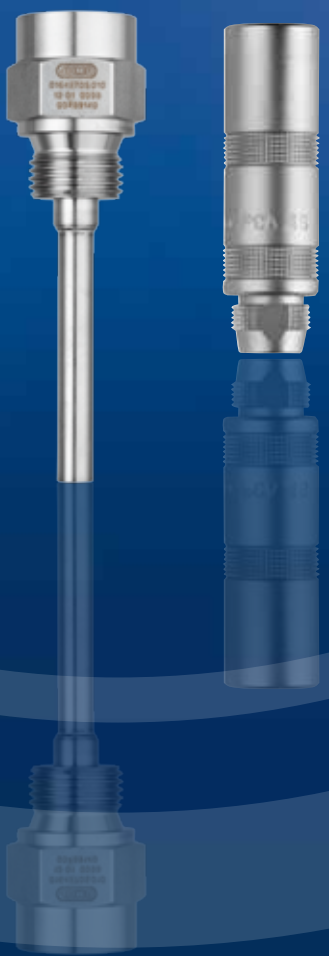



## Approvals/approval marks

- IC (Industry Canada), applies to 915 MHz, 902931/10, 230 V
- FCC (Federal Communications Commissions) for 915 MHz, 902931/10, 230 V
- c UL us (Underwriters Laboratories) 902931/10, 230 V

# Accessories

Various accessories are available for installation and/or connection to the evaluation devices such as installation fittings for thermocouples and RTD temperature probes, cables for proper connection, thermowells and ball valves with measuring points and connectors for problem-free replacement.
For further technical descriptions, please look under the specified data sheet number at **www.jumo.net**.



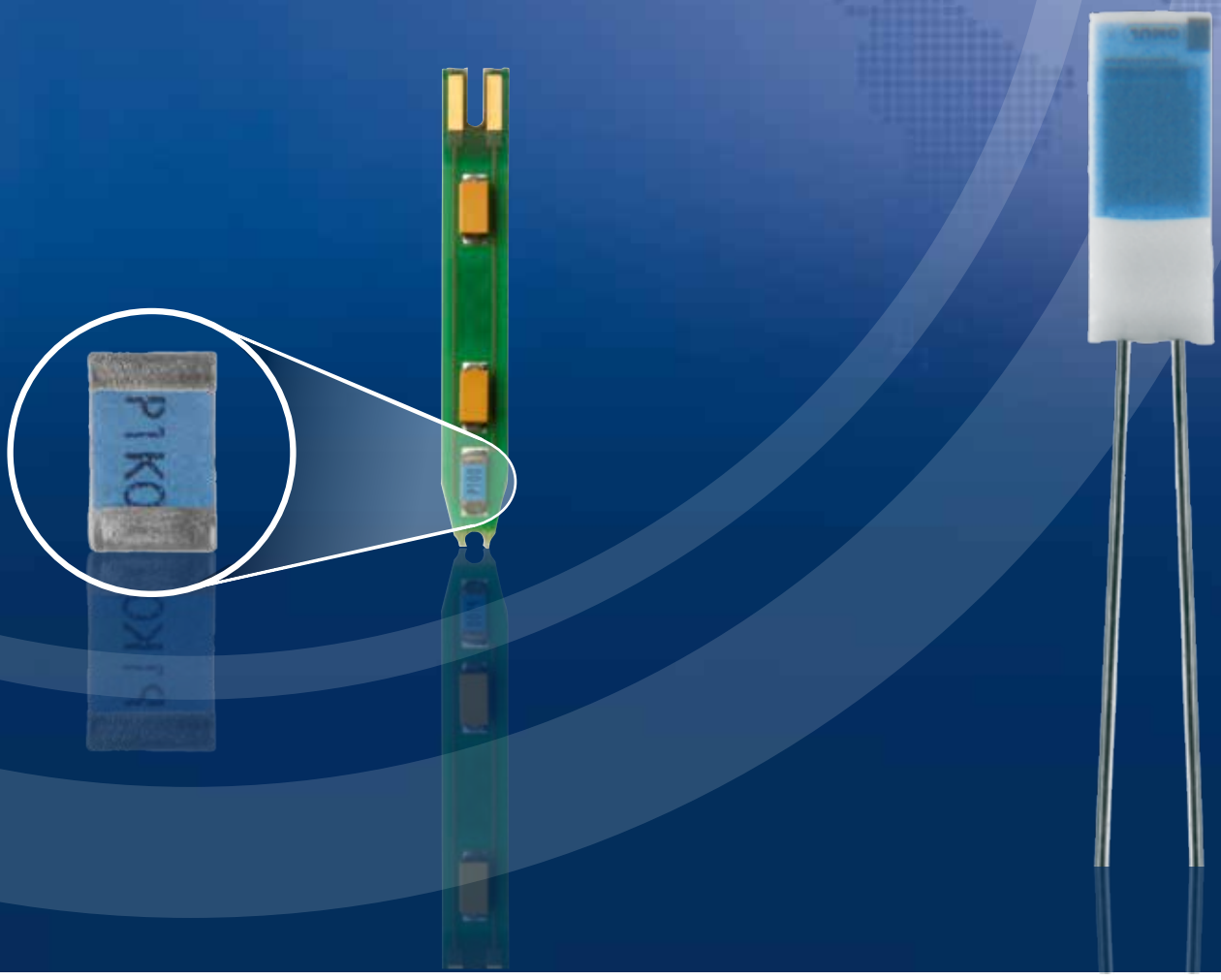
# Accessories

| | | | | | |
|---|---|---|---|---|---|
| | **Designation** | Mounting locations for temperature probes | Screw-in and weld-in thermowells | Terminal heads and bases | Compensating and connecting cables |
| | **Type/data sheet** | 902440 | 909710 | 909715 | 909735 |
| Application | **Features** | Ball valves, tees, thermowells, adapter screw connections, mounting accessories | For thermocouples and RTD temperature probes, thermometers can be replaced without emptying the system, thermowells made of different materials, operating pressure up to 320 bar | For thermocouples and RTD temperature probes, terminal heads made of different materials, protection type max. IP65, lead-sealable versions | Acc. to DIN EN 60584-3 and DIN 43713, for 2, 3 and 4-wire circuits, versions from –190 to +400 °C, casing tube made of PTFE, silicone, PVC or glass fiber, steel or stainless steel braiding, for single and double elements |

| | | | | | |
|---|---|---|---|---|---|
| | **Designation** | Measuring inserts for screw-in thermocouples and RTD temperature probes with terminal head form B | Thermal pairs according to 43732 | Pipe screw connection and flange, mating pieces for bayonet locks | Plug connections |
| | **Type/data sheet** | 909735 | 909744 | 909750 | 909760 |
| Application | **Features** | For temperatures from –200 to +1150 °C, as single and double measuring insert, available with transmitter | For temperatures up to +1600 °C, standardized thermoelectric voltage series according to DIN EN 60584, part 1, DIN 43710, for push-in thermocouples according to DIN 43 733 | For temperatures up to 550 °C, for variable insertion lengths, easy mounting and uncomplicated replacement, explosion-proof enclosure | For temperatures from –60 to +260 °C, easy replacement with permanently laid cable, fast connection of measuring instruments for test purposes, locking ensures contact reliability |

# Thin-film method platinum temperature sensors

JUMO offers a diverse assortment of platinum temperature sensors.
With an annual production of several million temperature sensors, we are one of the most important global suppliers.
From our clean room emerges precision and long-term stability. Tolerances from +/– 0.1 K are produced in series. Since the 1980s, modified processes from semi-conductor manufacturing have been adapted to Pt 100 production. Further customer benefits include economical mass production combined with the highest quality standards.



# Thin-film method platinum temperature sensors

Mechanical processes: welding, sawing

Photolithography: generating the structure on the substrate

Laser calibration of platinum chip temperature sensors

### JUMO relies on quality, that is combined with fair market prices

Thin-film method platinum temperature sensors promise excellent accuracy and long-term stability. To make this promise a reality, JUMO relies exclusively on Germany with its top-rate production location. The tough demands are met by qualified employees and an efficient QM system. Our modern production facilities are highly automated. This not only ensures great efficiency but also optimizes the price-to-performance ratio. However, our system still allows for a high level of flexibility so that we can respond to special customer applications.

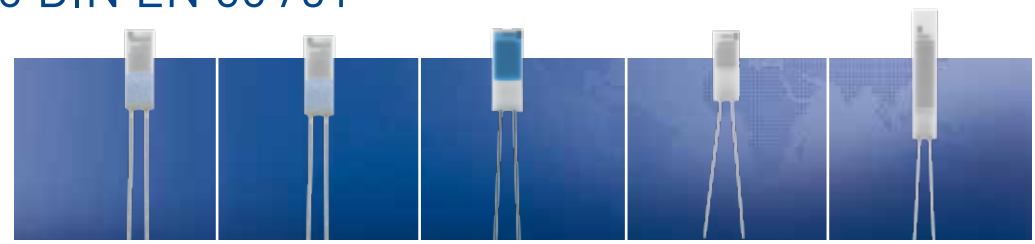
### More than 50 years of experience for our customers

Experience from our own temperature probe production is incorporated directly into the development of new temperature sensors. JUMO provides competent support for preparing and assembling temperature sensors.

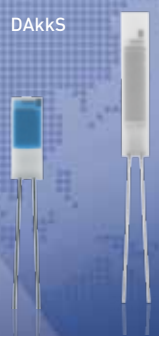
### Customized modifications

Customers and their application requirements are always the focus of attention, particularly when OEM applications are involved. Much in demand are not only mechanical and geometric system solutions, but also special selections with a low tolerance class.

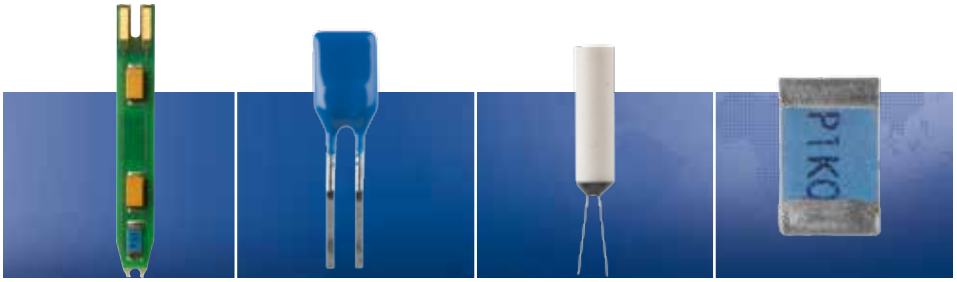
# Platinum-chip temperature sensors with connecting wires according to DIN EN 60 751



| | Designation | Design type PCA/L | Design type PCA/S | Design type PCA/E | Design type PCA/M | Design type PCA/H |
|---|---|---|---|---|---|---|
| | Type/data sheet | 906121 | | | | |
| Application | Features | Wide selection of types, the right sensor for every application | | | | |
| Application | Application ranges | Measurement and control, heating, air conditioning and ventilation, industrial electronics, vehicle manufacturing | | | | |
| Technical data | Wires | Ag 0.2 × 0.3 | Pt-Ni 0.2 mm | Ni 0.25 mm | Pt-Ni 0.2 mm | Pd 0.25 mm |
| Technical data | Operating temperature | –70 to +250 °C | –70 to +400 °C | –70 to +500 °C | –70 to +550 °C | –70 to +600 °C |
| Technical data | Processing | Soft-soldering | Crimping, welding, hard-soldering | | | Welding |
| Technical data | Sizes | 2 × 2.5 × 1.3 mm<br>2 × 5 × 1.3 mm<br>2 × 10 × 1.3 mm<br>4 × 5 × 1.3 mm | 2× 2.5×1.3 mm<br>2×5×1.3 mm<br>2×10×1.3 mm<br>1.2×4×1.1 mm | 1.5×2.5×1.0 mm<br>2×2.5×1.3 mm<br>2×5×1.3 mm | 1.5×2.5×1.0 mm<br>1.5×5×1.0 mm<br>2× 2.5 ×1.3 mm<br>2 × 5× 1.3 mm<br>2 × 10× 1.3 mm<br>4 × 5× 1.3 mm | 2 x 10 x 1.3 mm |
| Technical data | Nominal values | Pt 100<br>Pt 500<br>Pt 1000 | Pt 100<br>Pt 500<br>Pt 1000<br>Pt 2000 | Pt 100<br>Pt 200<br>Pt 1000 | Pt 100<br>Pt 200<br>Pt 500<br>Pt 1000 | Pt 100<br>Pt 500<br>Pt 1000 |



# Platinum temperature sensors in special design types




| | Designation | Design type PCSE | Design type PCKL | Design type PCR | Design type PCS |
|---|---|---|---|---|---|
| | Type/data sheet | 906122 | 906123 | 906124 | 906125 |
| Application | Features | Prefabricated measuring insert | Sturdy and protected against moisture | Can be used unprotected | Excellent linear characteristic curve and high long-term stability |
| Application | Application ranges | Measurement and control, heating, air conditioning and ventilation, industrial electronics | | | |
| Technical data | Wires | – | | Pt-Ni 0.2 mm | – |
| Technical data | Terminal clamps | – | Galvanized | – | |
| Technical data | Contact areas | Gold plated | – | | |
| Technical data | Solder connections | – | | | Galvanized all-around contact with diffusion lock |
| Technical data | Operating temperature | –20 to +150 °C | –30 to +105 °C | –70 to +300 °C | –50 to +150 °C |
| Technical data | Processing | Soft-soldering | | Crimping, welding, hard-soldering | Reflow soldering, wave soldering |
| Technical data | Sizes | 4.3 × 15 × 2.2 mm<br>4.1 × 28 × 2.2 mm | 3.9 × 5 × 1.5 mm | 3.8 × 15 mm<br>4.8 × 15 mm | 1.3 × 2.0 ×0.5 mm, 0815<br>1.5 × 3.1 ×0.8 mm, 1206 |
| Technical data | Nominal values | Pt 100<br>Pt 500<br>Pt 1000 | Pt 100<br>Pt 1000 | Pt 100<br>Pt 500<br>Pt 1000 | Pt 100<br>Pt 500<br>Pt 1000 |

# DAkkS

When regulation (EC) No. 765/2008 took effect on January 1, 2010, control over accreditation in Europe was completely revised. Accreditation is now the responsibility of a single national accreditation body for each member state.
In the Federal Republic of Germany, §13 paragraph 1 of AkkstelleG (the accreditation body law) transfers monitoring duties to the Deutsche Akkreditierungsstelle GmbH (DAkkS).

JUMO

akkreditiert durch die / *accredited by the*

**Deutsche Akkreditierungsstelle GmbH**

als Kalibrierlaboratorium im / *as calibration laboratory in the*

**Deutschen Kalibrierdienst** DKD

Kalibrierschein
*Calibration certificate*

*Calibration mark*: 0001 | D-K-15129-01-00 | 2010-12

| | |
|---|---|
| Gegenstand *Object* | **Platinwiderstandsthermometer** |
| Hersteller *Manufacturer* | **JUMO GmbH & Co. KG** |
| Typ *Type* | **90.286-F30 /sl** |
| Fabrikat/Serien-Nr. *Serial number* | **0523 0005** |
| Auftraggeber *Customer* | **JUMO GmbH & Co. KG** |
| Auftragsnummer *Order No.* | **D – 36039 Fulda** **123456** |
| Anzahl der Seiten des Kalibrierscheines *Number of pages of the certificate* | **5** |
| Datum der Kalibrierung *Date of calibration* | **14.12.2010** |

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem internationalen Einheitensystem (SI).
Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.
*This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).*
*The DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates.*
*The user is obliged to have the object recalibrated at appropriate intervals.*

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung sowohl der Deutschen Akkreditierungsstelle als auch des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine ohne Unterschrift haben keine Gültigkeit.
*This calibration certificate may not be reproduced other than in full except with the permission of both the German Accreditation Body and the issuing laboratory. Calibration certificates without signature are not valid.*

| Datum *Date* | Leiter des Kalibrierlaboratoriums *Head of the calibration laboratory* | Bearbeiter *Person in charge* |
|---|---|---|
| 14.12.2010 | Matthias Nau | Stefan Krummeck |

Mail: JUMO GmbH & Co. KG, Moritz-Juchheim-Straße 1, D – 36039 Fulda, Germany
Mailto: Stefan.Krummeck@JUMO.net
Internet: www.jumo.net

# DAkkS calibration service

| Calibration object | Measuring range | Measurement uncertainty |
|---|---|---|
| – RTD temperature probes | 0.01 °C | 5 mK |
| – Direct display of electronic thermometers (temperature measuring chains) | –80 to 0 °C | 15 mK |
| – Data logger | >0 to 90 °C | 10 mK |
| | >90 to 300 °C | 15 mK |
| – Thermocouples | –80 to +200 °C | 0.2 K |
| | >200 to 300 °C | 0.3 K |
| – Precious metal thermocouples | >300 to 1100 °C | 1.0 K |
| – Non-precious metal thermocouples | >300 to 1100 °C | 1.5 K |
| – Direct display electronic thermometers | | |
| – Resistance thermometers with transmitter | –80 to 0 °C | 45 mK |
| – Direct display electronic thermometers with transmitter | >0 to 90 °C | 40 mK |
| | >90 to 300 °C | 45 mK |
| – Temperature block calibrators | 30 to 133 °C | 0.2 K |
| | >133 to 660 °C | 1.5 mK x (T) |
| | >660 to 1100 °C | 2.5 K |

Lab ID D-K-15129-01-00, (extended options through factory calibration on request)

### Accuracy matters

The requirements for almost all processes continuously grow in terms of increased output and quality as well as lower process costs. Reducing the measurement uncertainty of the systems used to record process parameters is often closely tied to this trend. At the same time, new standards increase the requirements for documenting processes and monitoring measuring equipment.

As a result, the main criterion for all calibrations is to trace the measurement results back to national standards. Unless otherwise specified, DAkkS-calibrated temperature probes and testing equipment are generally recognized as the instrument for retracing measurement results to standards in Europe and abroad.

### JUMO calibration laboratory

Temperature is one of the most important process variables. The JUMO calibration laboratory has been accredited for temperature as a process variable since 1992. The current DAkkS accreditation again confirms competence according to DIN EN ISO/IEC 17025:2005 and also authorizes calibrations of RTD temperature probes, thermal pairs und block calibrators.

### On-site calibration service

Measurement equipment used for calibration cannot always be taken out of service for several days, let alone disassembled and sent in for calibration. Our on-site calibration service ensures especially short down times for these situations. The JUMO on-site calibration service also takes into account local installation conditions. The service engineer can also repair or replace individual components if necessary. The retraceable measurement results are created according to DIN EN 10204, including use of a certified quality management systems according to DIN EN ISO 9001:2000.

# Services & Support

It is the quality of our products that is responsible for such a high level of customer satisfaction. But our reliable after-sales service and comprehensive support are also appreciated. Let us introduce you to the key services we provide for our innovative JUMO products. You can count on them – anytime, anywhere.

**JUMO Services & Support – so that it all comes together!**

## Manufacturing Service

Are you looking for a competitive and efficient system or component supplier? Regardless of whether you seek electronic modules or perfectly fitting sensors, either for small batches or mass production – we are happy to be your partner. From development to production we can provide all the stages from a single source. In close cooperation with your business our experienced experts search for the optimum solution for your application and incorporate all engineering tasks. Then JUMO manufactures the product for you.
As a result, you profit from state-of-the-art manufacturing technologies and our uncompromising quality management systems.

### Customer-specific sensor technology

- Development of temperature probes, pressure transmitters, conductivity sensors, or pH and redox electrodes according to your requirements
- A large number of testing facilities
- Incorporation of the qualifications into application
- Material management
- Mechanical testing
- Thermal test

### Electronic modules

- Development
- Design
- Test concept
- Material management
- Production
- Logistics and distribution
- After-sales service

### Metal technology

- Toolmaking
- Punching and forming technology
- Flexible sheet metal machining
- Production of floats
- Welding, jointing, and assembly technology
- Surface treatment technology
- Quality management for materials


## Information & Training

Would you like to increase the process quality in your company or optimize a plant? Then use the offers available on the JUMO Web site and benefit from the know-how of a globally respected manufacturer. For example, under the menu item "Services and Support", you will find a broad range of seminars. Videos are available under the keyword "E-Learning" about topics specific to measurement and control technology. Under "Literature" you can learn valuable tips for beginners and professionals. And of course, you can also download the current version of any JUMO software or technical documentation for both newer and older products.

## Product Service

We have an efficient distribution network on all five continents available to all of our customers so that we can offer professional support for everything concerning our product portfolio. Whether you need assistance in a consultation, with product selection, engineering, or optimum usage of our products – a team of professional JUMO employees is near you, ready to help. Even after our devices are commissioned you can count on us. Our telephone support line is available to give you answers quickly. If a malfunction needs to be repaired on site, our Express Repair Service and our 24-hour replacement part service are available to you. That provides peace of mind.

## Maintenance & Calibration

Our maintenance service helps you to maintain optimum availability of your devices and plants. This prevents malfunctions and downtime. Together with the responsible parties at your company we develop a future-oriented maintenance concept and are happy to create all required reports, documentation, and protocols. Because we know how important precise measurement and control results are for your processes we naturally also professionally calibrate your JUMO devices – on site at your company or in our accredited DAkkS calibration laboratory for temperature. We record the results for you in a calibration certificate according to EN 10 204.

www.jumo.net

PR 90024 EN/2012-04-20/00323124